

REMARKS

In view of the following remarks, reconsideration is respectfully requested.

I. 35 U.S.C. § 103(a) Rejection

Claims 1, 5, 9 and 10 were rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Krishnamurthy (U.S. 6,256,038), Bronskill (U.S. 6,201,549), Moreton (U.S. 5,636,338) and/or Kuragano (JP 62135965). This rejection is believed clearly inapplicable to independent claims 1, 5, 9 and 10 and the claims that depend therefrom for the following reasons.

Independent claim 1 recites a computer aided design system including, in part, a first fundamental form computing device for computing coefficients of a first fundamental form at a mesh point of the mesh, the coefficients of the first fundamental form being defined at the mesh point by first-order differential values of the mesh point, and a second fundamental form computing device for computing coefficients of a second fundamental form at the mesh point, the coefficients of the second fundamental form being defined at the mesh point by a product of second-order differential values of the mesh point and a normal vector of the mesh at the mesh point. In addition, claim 1 recites a memory device that stores point sequence information, and the coefficients of the first and second fundamental form.

Bronskill Reference. Initially, please note that the above-described 35 U.S.C. § 103(a) rejection relies on Bronskill for teaching a first fundamental form computing device for computing coefficients of a first fundamental form at a mesh point of the mesh, the coefficients of the first fundamental form being defined at the mesh point by first-order differential values of the mesh point, as recited in claim 1.

However, Bronskill discusses that tangent and normal vectors of plane geometry are in a two-dimensional space (see Figs. 9 and 11, and col. 7, lines 50-65, where only X and Y coordinates are considered).

Applicants note that coefficients of the first fundamental form, as recited in claim 1, are defined in the field of surface geometry in a three-dimensional space. Thus, in view of the above, it is clear that Bronskill merely discloses that tangent and normal vectors are used in a two-dimensional space, but fails to disclose or suggest the first fundamental form computing device for computing coefficients of a first fundamental form (i.e., coefficient defined in a three-dimensional space) at a mesh point of the mesh, the coefficients of the first fundamental form being defined at the mesh point by first-order differential values of the mesh point, as recited in claim 1.

In other words, the tangent and normal vectors disclosed by Bronskill are only in a two-dimensional space and are related to space geometry, whereas claim 1 requires the computing of coefficients of a three-dimensional space related to surface geometry (i.e., coefficients of the first fundamental form). As a result, Bronskill fails to disclose or suggest the above-mentioned limitations required by claim 1.

Moreover, the Applicants also note that Bronskill is not analogous art to the present invention, because the invention of Bronskill is only related to the field of digital drawing and painting for the purpose of producing brush strokes that appear to be hand drawn and/or painted (see col. 1, lines 6, 7 and 51-53). The present invention of claim 1 is related to a CAD system, having an objective to provide a system in which an error does not occur between the input and the output of the system, and to regenerate a curved surface in which the error does not occur.

In view of the above, it is clear that the objective of Bronskill is to produce electronic brush strokes that appear to be hand drawn/painted, which is completely different from the objective of the CAD system of the present invention, which is to regenerate a curved surface in which an error does not occur.

As a result, it is apparent that the invention of Bronskill is not from the same field of endeavor as the present invention of claim 1.

In addition, the Applicants note that in item 10 on page 4 of the Office Action, the rejection states that it would have been obvious to combine the tangent and normal vectors of Bronskill with the CAD system of Krishnamurthy, in view of the motivation to produce “highly realistic ... images” (see Bronskill, col. 9, lines 60-67). However, after reviewing col. 9, lines 60-67 of Bronskill, it is apparent that Bronskill actually states producing “highly realistic artistic or photo stroke images,” which is completely different from the field of endeavor of the present invention.

In view of the above, Bronskill fails to disclose or suggest the above-mentioned distinguishing features of claim 1.

Krishnamurthy Reference. Note that the above-described 35 U.S.C. § 103(a) rejection relies on Krishnamurthy for teaching a memory device which stores the point sequence information, the coefficients of the first fundamental form and the coefficients of the second fundamental form, as recited in claim 1 (see item 15 on page 6 of the Office Action).

However, in item 7 on page 4 of the Office Action the rejection states that Krishnamurthy does not teach defining tangent and normal vectors to the curved meshed surface. Thus, in view of the above, it is unclear as to how Krishnamurthy can be relied upon for disclosing storing the coefficients of the first and second fundamental form, as required by claim 1, because, as

acknowledged in the Office Action, Krishnamurthy does not teach defining tangent and normal vectors. The Applicants kindly request for clarification of the Examiner's position.

In view of the above, it is submitted that Krishnamurthy fails to disclose or suggest the above-mentioned features of claim 1.

Kuragano Reference. Note that in item 6 on page 4 of the Office Action, claims 1, 5, 9 and 10 are rejected as being unpatentable over Krishnamurthy, Bronskill, and Kuragano. However, the rejection does not explain which portions of Kuragano are being relied upon and does not explain which portions of the claimed invention are being compared to Kuragano. As a result, the Applicants are unable to respond to the present rejection of claims 1, 5, 9 and 10. Therefore, if the Examiner does not change his position in regards to the above-mentioned rejection, the Applicants kindly request that the Examiner issue another non-final Office Action.

Combination of Krishnamurthy, Bronskill and Kuragano References. As discussed above, Bronskill is not analogous art to the present invention. Further, even if Krishnamurthy, Bronskill and Kuragano are combined, it is respectfully submitted that a person of ordinary skill in the art would not have arrived at the invention of claim 1.

Specifically, Krishnamurthy, Bronskill and Kuragano are based on the concept of plane geometry in a two-dimensional space. In contrast and as discussed above, the present invention of claim 1 is based on the concept of surface geometry in a three-dimensional space. In other words, the concept of plane geometry is not readily applicable to the reproduction of the curved surface without an approximation error, as required by claim 1. Furthermore, if the concept of plane geometry is applied to the reproduction of the curved surface according to claim 1, an error due to the difference between geometric concepts will occur. Therefore, an additional means for

correcting this error, which is not disclosed or suggest in the referenced prior art, would be required to achieve the invention of claim 1.

As noted above, the objective of the present invention is to provide a CAD system and a CAD program, which can greatly utilize a computer graphics model or a CAD model, and improve the efficiency of design and production processes.

Accordingly, if Krishnamurthy, Bronskill and Kuragano were to be combined, a person of ordinary skill in the art would not have reached the objective according to the present invention.

Additionally, the Applicants note that the combination of Krishnamurthy, Bronskill and Kuragano cannot be said to disclose or suggest the memory device which stores the point sequence information, the coefficients of the first fundamental form and the coefficients of the second fundamental form, as required by claim 1.

Moreton Reference. Claims 1, 5, 9 and 10 were also rejected under 35 U.S.C. § 103(a) as being unpatentable over the combination of Krishnamurthy, Bronskill and Moreton.

The invention of Moreton is based on the concept of surface geometry. In contrast and as discussed above, Krishnamurthy and Bronskill are based on the concept of plane geometry. Therefore, as established above, the concepts of plane geometry as described in Krishnamurthy and Bronskill cannot be combined with the concept of surface geometry as described in Moreton, to achieve the invention as recited in claim 1.

Furthermore, after reviewing Moreton, the Applicants have found that Moreton defines fundamental forms using equations (see col. 12, lines 7-34; col. 14, lines 14-21; and col. 18, lines 5-30). However, Moreton fails to disclose or suggest utilizing the fundamental forms, such that the coefficients of the first fundamental form are defined at the mesh point by first-order

differential values of the mesh point, and fails to disclose or suggest a second fundamental form computing device that computes coefficients of a second fundamental form at the mesh point, the coefficients of the second fundamental form being defined at the mesh point by a product of second-order differential values of the mesh point and a normal vector of the mesh at the mesh point, as recited in claim 1.

Therefore, because of the above-mentioned distinctions it is believed clear that claim 1 and claims 2-4 that depend therefrom would not have been obvious or result from any combination of Krishnamurthy, Bronskill, Kuragano and Moreton.

Furthermore, there is no disclosure or suggestion in Krishnamurthy, Bronskill, Kuragano and/or Moreton or elsewhere in the prior art of record which would have caused a person of ordinary skill in the art to modify Krishnamurthy, Bronskill, Kuragano and/or Moreton to obtain the invention of independent claim 1. Accordingly, it is respectfully submitted that independent claim 1 and claims 2-4, 11 and 12 that depend therefrom are clearly allowable over the prior art of record.

Independent claims 5, 9 and 10 are directed to a program, a system and a program, respectively and each recite features that correspond to the above-mentioned distinguishing features of independent claim 1. Thus, for the same reasons discussed above, it is respectfully submitted that independent claims 5, 9 and 10 and claims 6-8 and 13-18 that depend therefrom are allowable over the prior art of record.

II. Conclusion

In view of the above remarks, it is submitted that the present application is now in condition for allowance and an early notification thereof is earnestly requested. The Examiner is invited to contact the undersigned by telephone to resolve

Respectfully submitted,

Masami MIURA et al.

/Andrew L. Dunlap/

By 2009.12.22 15:23:47 -05'00'

Andrew L. Dunlap
Registration No. 60,554
Attorney for Applicants

ALD/led
Washington, D.C. 20005-1503
Telephone (202) 721-8200
Facsimile (202) 721-8250
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